

# Silicon hat for GAMMA-400

A thin gamma detector to detect cosmic photons  
in the 10-100 MeV region



INFN-PD

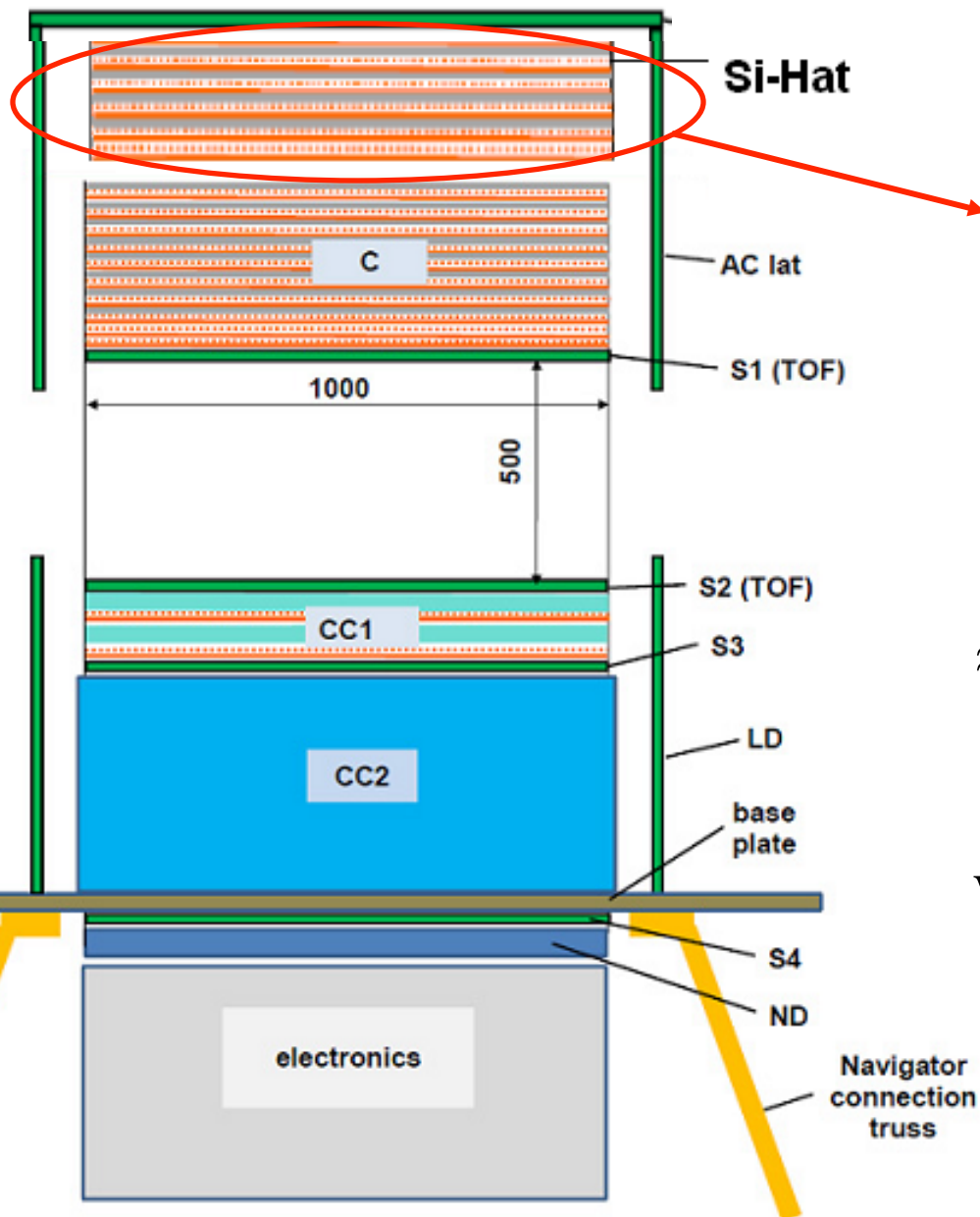
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INFN-TS:

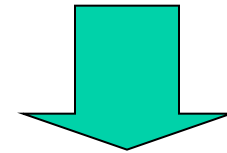
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# Silicon Hat

- The region 10 MeV – 100 MeV is the less known of the photon spectrum in the High Energy region. It is the typical transition region between the synchrotron radiation and the inverse Compton region and crucial to discriminate between hadronic and e.m. origin.
- Several projects have been proposed to fill this window, but it could also be envisaged to add to GAMMA-400 a *top* detector sensitive between 10 and 100 MeV, given the weight budget of few tons for the satellite scientific payload.
- A possible solution, with good angular resolution in this region, could be the use of SSD (either single-sided or double-sided) with no converter. In principle, this could also allow the measurement of polarization from the correlation of the plane of conversion with the axis of polarization.

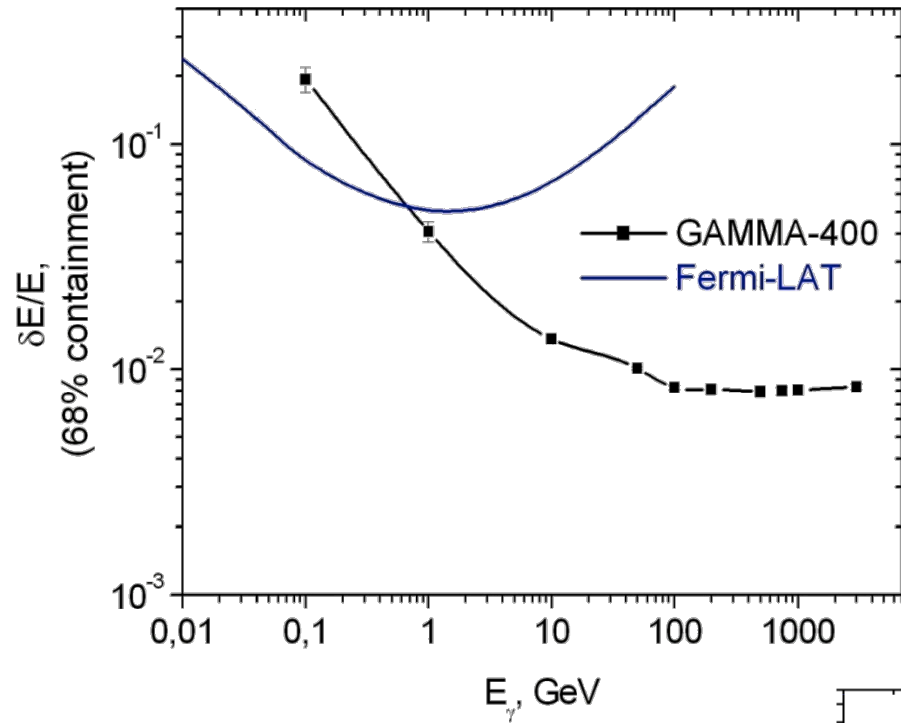


10-30 x-y Si-planes  
(thickness: 0.5 mm)  
+ electronics  
no passive converter

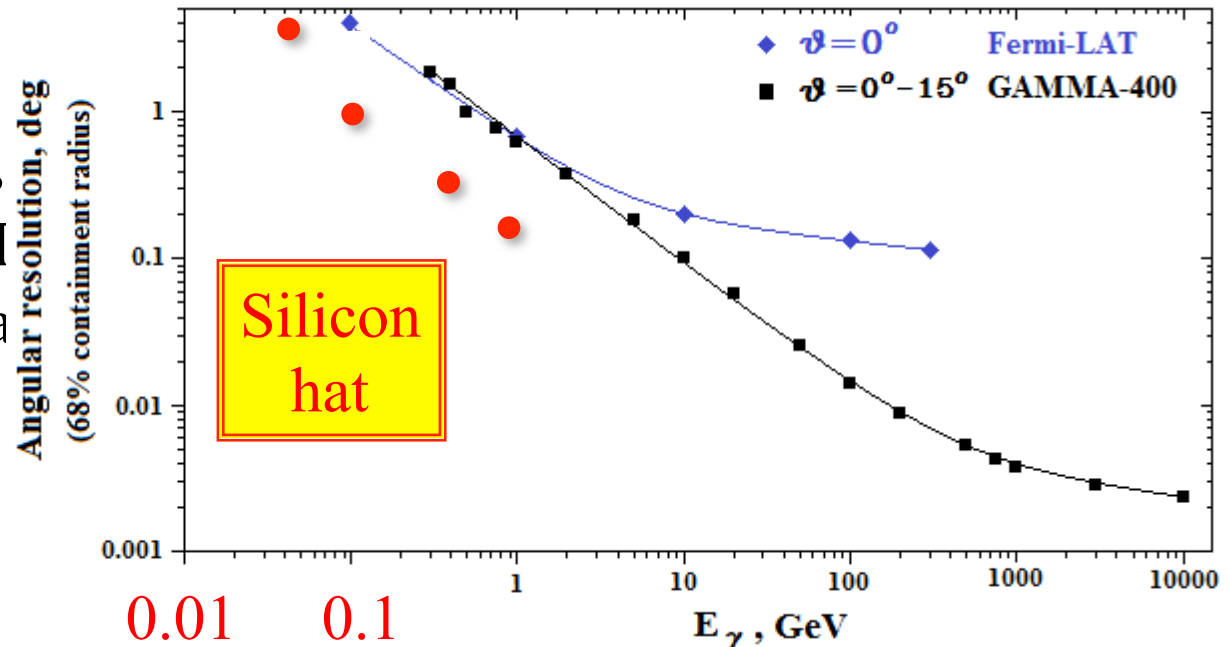


$\approx 10\% X_0$  of total conversion  
additional  $\sim 400 \text{ cm}^2$  of  $A_{\text{eff}}$   
at  $E \sim 100 \text{ MeV}$   
with  $\sim 1^\circ$  of  $PSF$  at 100 MeV.

# Energy resolution vs. energy for normal incidence for Fermi-LAT and GAMMA-400



Angular resolution vs  
energy for Fermi-LAT  
(for normal incidence) and  
GAMMA-400 (for  $\theta=0^\circ$ -



# Conclusions

- Si technology: PROVEN
- Double-sided Si: FEASIBLE
- ASI-INFN-Roscosmos:
  - agreement signed on Gamma400
  - LoI on its way + INFN-LPI agreement
- FBK contractor:
  - agreed to a set of preliminary tests
- INFN (mainly PD): coordinate assembling/testing
- INFN (mainly TS): green light from Gamma400
- INFN TS+PD:
  - simulation, design and characterization